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# AUTOMATIC DATA PROCESSING SYSTEM PHASE I STUDY REPORT [redacted] 25X1

## VOLUME IV. BUDGETARY ANALYSIS [redacted] 25X1


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25X1 [redacted]

TRW
DEFENSE AND SPACE SYSTEMS GROUP
ONE SPACE PARK • REDONDO BEACH, CALIFORNIA

25X1

[redacted]

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## 1.0 INTRODUCTION [redacted] 25X1

This Budgetary Analysis Report was prepared as part of Study Phase I. It provides preliminary cost data to assist the DO/IMS in making continuing decisions about the project. The Budgetary Analysis reflects the knowledge gained by the Project Team in studying DO ADPS requirements and assessing compatibility with SAFE. Because architectural analysis and implementation planning will not be done until the next phase, it was necessary to make certain assumptions about architecture and implementation for budget estimating purposes. Certain variables were also studied in order to scope trade-offs, such as consideration of IBM versus Burroughs hardware. Because of such uncertainties, the cost data contained in this report should be treated as preliminary. A nominal baseline was defined to represent the Project Team's best estimate of the realistic costs involved in developing a DO ADPS program based on SAFE technology. [redacted] 25X1

## 2.0 ANALYSIS [redacted] 25X1

25X1 2.1 System Architecture [redacted]

In order to perform the Budgetary Analysis, a System Architecture was selected as a point of reference for Cost Estimation. The selected architecture was innovated by [redacted] It includes mapping the 25X1
DO/IMS processing functions onto the SAFE tri-level architecture. At the Global level, there are two processors analogous to the Red and Blue processors currently used in the DO/IMS Processing Center. To these processors, the Study Team added an optional processor at the Global level to contain the SAFE Global software. [redacted] 25X1

The User Services level employs three subsystems, as follows:

(1) System Control and Monitor (SCM) which provides security control, management information, and network control.

(2) User Terminal Support (UTS) which provides user command language and user services.

(3) Electronic Message Processing (EMP) which provides the incoming and outgoing message interfaces to CDS, ODP and SAFE.

The Workstation level contains the user workstation terminals and printers (local and regional). Two communications busses provide the appropriate data paths between levels. Figure 2-1 illustrates this architecture. Also shown at the Global level is an additional processor complex which contains the SAFE Global software as an entity separate from the Red/Blue CPUs. [redacted] 25X1

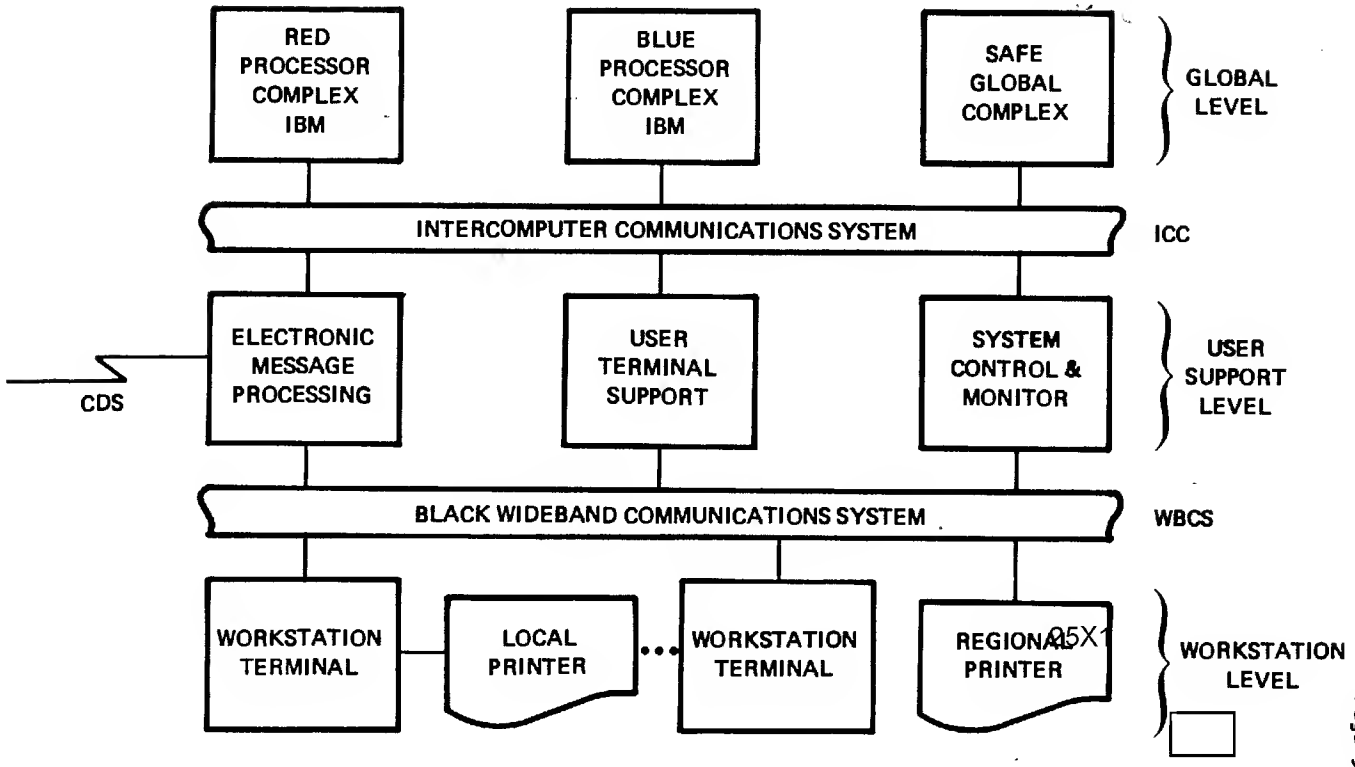


Figure 2-1. Tri-Level Architecture Configuration [redacted] 25X1

Since the analysis was based entirely on Headquarters processing requirements, no references to the field installations were included in the system architecture. [redacted] 25X1

A spectrum of system architectures will be examined in Study Phase II to find the one which best suits the objectives of the DO ADPS. Criteria for evaluation will include, but not be limited to, the following:

(a) Satisfaction of functional requirements
(b) Performance (response times)
(c) Reliability, Availability, Maintainability
(d) Security
(e) Growth capability and growth path
(f) Cost
(g) Compatibility with current processing systems. [redacted] 25X1

These comparative studies will possibly result in recommended changes to the architecture presented herein. [redacted] 25X1

For purposes of the Budgetary Analysis, hardware implementations of IBM versus Burroughs were examined at each subsystem with the exception of the Red/Blue processor (or its equivalent), which is presumed to be GFE IBM hardware. The candidate implementations are described in Figure 2-2. [redacted] 25X1

| Level | Subsystem | Function | Implementation 1 | 2 | 3 |
|---|---|---|---|---|---|
| Global | Red (Equiv.) | STAR, COMET | IBM | IBM | IBM |
| Global | Blue (Equiv.) | DBMS, Develop. | IBM | IBM | IBM |
| Global | SAFE Global | DBMS, Search | Burroughs | IBM | IBM |
| User Support | SCM | System Control and Monitor | Burroughs | Burroughs | IBM |
| User Support | UTS | User Terminal Support | Burroughs | Burroughs | IBM |
| User Support | EMP | Elect. Message Processing | Burroughs | Burroughs | IBM |

25X1

Figure 2-2. Hardware Implementation Alternatives for Processor Complexes in Tri-level Architecture. [redacted]

25X1

2.2 Compatibility with Ongoing Development [redacted] 25X1

The budgetary implications of integrating all or some of the on-going CIA computer system development programs such as COMET II, Records Update Management, AIMS, CAMS2, CRAFT, etc. are important Clearly, there are benefits to be gained in using rather than duplicating these programs. But, until these programs are studied and better understood analytically, the associated costs cannot be judged with confidence. It was assumed, therefore, for the purposes of the Budgetary Analysis, that the technology from these programs would be available to be used and integrated into a new DO ADPS at no R&D cost. However, integration and test costs would be incurred if it was determined that these existing/developmental programs should be 25X1 incorporated. [redacted]

Another factor affecting cost is the implication of using the new system in the field. Deciding whether or not central data bases will be available and accessible to field personnel by electronic means could make a substantial difference in the cost of the system. The budgetary analysis assumes that a growth capability will be provided in the DO ADPS to provide on-line support to the field with a centralized data base, but, the cost of providing this capability was deferred pending further definition of the field use. [redacted] 25X1

25X1 2.3 Compatibility with SAFE [redacted]

Much of the analysis and design of SAFE is transportable to the DO ADPS as discussed in Volume III, Compatibility. The software layers and their associated elements provide an appropriate framework into which the special capabilities required for DO can be merged. The high degree of compatibility ensures a very good preliminary structure from which to start the software development. Similarly, certain of the SAFE hardware is highly compatible, such as the WBCS (cable and BIUs), Delta Data terminals, and PIUs (if Burroughs midi-processors are used). The budgetary analysis is based on availability of SAFE design at no cost and hardware recurring costs at the same rates as those incurred by the SAFE project. [redacted] 25X1

25X1

2.4 Implementation Plan

In addition to hardware and software variables, there are other factors which can influence the magnitude of the budget needed for implementing a new ADPS for the DO. One of these is the program schedule. Implementation of an ADPS development program for the DO can be accomplished in a timeframe ranging from three to five years. A three-year program would dovetail more closely with SAFE's own schedule, thereby ensuring continuity of ideas and experienced personnel. In addition, the three-year program has the advantage of realizing operational benefits sooner for those who will use the system. Though the decision to effect an upgrade in three years may not prove more expensive than a five-year schedule, it implies an earlier financial commitment from management.

25X1

The baseline five-year schedule used for this analysis follows a four-step approach, namely:

(1) Complete Study Phase II (May 1981 - December 1981).

(2) Develop a Pilot System with reduced capability and a small user population (January 1982 - December 1983).

(3) Develop the Full Headquarters DO ADPS capability based on expansion and enhancement of the Pilot yielding full functional capability and a full user population in Headquarters (January 1984 - December 1985).

(4) Develop expanded capability for additional functional refinements, expanded data base, and broader user population, e.g., field support (January 1986 onward).

The current Budgetary Analysis is focused on the combined items (2) and (3) only.

25X1

This approach leads to a Pilot System Initial Operating Capability (IOC) in just under three years from now and a Full Headquarters DO ADPS IOC in just under five years from now. If priorities and urgency of need dictate, it will be possible to define a program leading to the Full Headquarters IOC in approximately three years from now.

25X1

## 2.5 Task Allocations to Organization [redacted] 25X1

Another consideration has to do with roles and responsibilities. The program will cost less, from a contractual viewpoint, if, for example, a decision were made to have some of the work performed in-house. At present, IMS, ODP, and IBM all have a stake in the system and have assigned people to support it. These human resources are seasoned and skilled. A decision must be made on how best to employ them with minimum risk and cost. At this time, it is not possible to measure what the cost trade-offs will be under different conditions. [redacted] 25X1

It is assumed that appropriate organizational assignments will be made to optimize the composition of the development team. For example, the COMET II system, which is being developed by a joint IMS and IBM team, should continue to be worked on by these knowledgeable people. Appropriate interfaces or "hooks" could best be implemented by them. Part of the Study Phase II Implementation Planning task is to detail these responsibilities. [redacted] 25X1

## 2.6 Summary of Assumptions [redacted] 25X1

The budgetary analysis contained in this report, therefore, is based on the following set of assumptions:

(a) That a three-level (Global, User Support, Work-station) computer architecture will prevail for the DO ADPS much as it now does for SAFE.

(b) That IBM, Burroughs, or some combination of the two, will be the main computer equipment used by the new DO ADPS system.

(c) That approximately 80 percent of the software being fashioned for SAFE will be applicable to the DO.

(d) That current Agency developmental work is available to be integrated into the ADPS (COMET II, Records Management, AIMS, CAMS2-DBMS).

(e) That a three to five-year development timeframe is reasonable.

(f) That other relevant cost factors which cannot be estimated now could easily account for a variation of as much as 25 percent in the estimates included in this preliminary budgetary analysis. [redacted] 25X1

## 3.0 COST ESTIMATES [redacted] 25X1

25X1 3.1 Hardware [redacted]

Hardware implementation alternatives were examined for both Burroughs and IBM equipment. Section 3.1.1 describes the Burroughs equipment and prices by subsystem for the assumed tri-level architecture. Similar data for IBM equipment is shown in Section 3.1.2. Data for the hybrid implementation which includes both Burroughs and IBM is presented in Section 3.1.3. [redacted] 25X1

The ADPE implementations for the Full Headquarters System Initial Operating Capability (IOC) are defined. These ADPE implementations represent the minimal equipment necessary to provide the required functionality and reasonable performance for the Full System. [redacted] 25X1

Burroughs prices are based on the extended quantity purchases covered under the SAFE contract, i.e., typically a 25 percent discount level. All IBM prices are from the GSA FY-81 Authorized ADP Schedule Price List. Hardware quantities are based on the judgment of the study team. [redacted] 25X1

### 3.1.1 Burroughs ADPE Configurations [redacted] 25X1

The Burroughs configuration was based on the planned SAFE implementation with minor revisions in quantity and style number to address consideration of the current requirements. Price discounts were assumed to be the same as those for quantities extending beyond the primary contract agreement for SAFE procurement. This is typically 25 percent on most equipment line items. (U)

Tables I through IV provide cost data for the major processing subsystems, exclusive of the Red/Blue CPUs. When added together, these tables provide the cost for implementation 1 as defined above in Figure 2-2. These 25X1 total Hardware costs are [redacted] for the Full Headquarters DO ADPS 25X1 System. [redacted]

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25X1

### 3.1.2 IBM ADPE Configurations

Implementations of the tri-level architecture using IBM equipment for the Full Headquarters DO ADPS Initial Operating Capability (IOC) are defined. These configurations are considered to be preliminary and will be refined during the planned Architectural Analysis Task. The purpose for the present construction is to provide a basis for the Budgetary Analysis. Model numbers and feature codes are provided as representative system elements to establish a basis for the cost estimates. 25X1

Tables V through VIII provide cost data for the IBM Global, SCM, UTS, and EMP subsystems, respectively. When these costs are combined, they provide an estimate of the processing hardware cost for implementation 3 as defined above in Figure 2-2. The estimate for the Full System is 25X1 25X1

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3.1.3 Hybrid ADPE Configuration [redacted] 25X1

The hybrid ADPE configuration uses a mix of IBM and Burroughs equipment configured into a heterogeneous network. The Global level incorporates IBM, while the mid-level incorporates Burroughs. This configuration corresponds to implementation 2, as defined above in Figure 2-2. A summary of the subsystem costs, based on the two preceding sections, is provided below. [redacted] 25X1

| | Full System Total Cost |
|---|---|
| Red/Blue Processors | GFE |
| IBM Global | [redacted] 25X1 |
| Burroughs SCM | |
| Burroughs UTS | |
| Burroughs EMP | |
| Total | [redacted] 25X1 |

25X1 3.2 Software [redacted]

The DO System software cost estimates are based on Delivered Executable Machine Instructions (DEMIs). In order to determine the number of DEMIs required from the DO System, the following assumptions were made:

(a) The following SAFE Subsystems were directly relatable to the DO System Architecture:

(1) System Control and Monitor Subsystem (SCM)

(2) External Message Processing Subsystem (EMP)

(3) User Terminal Support Subsystem (UTS)

(4) SAFE DIA Intelligence Data File Batch Process Subsystem (BPS)

(5) The DEMI estimates from the current SAFE Development were used as a baseline

(6) The estimates for new DO specific DEMIs are based on similar SAFE software DEMI counts.

(7) Current RED/BLUE processors would be included as part of any DO System. [redacted] 25X1

Three architectural implementations were examined for the software costing. The first implementation corresponds to implementation 1 of Figure 2-2 and used Burroughs processors and SAFE software for the mid-level subsystems (SCM, EMP, and UTS) with the current Red/Blue IBM processors, as well as a Burroughs processor with the SAFE software for the Global level (reference 3.1.1). The second implementation is a hybrid variation of the first. In this implementation the Global level has only the current Red/Blue IBM processors; and, the SAFE software which resided in the Burroughs Global processor is retrofitted onto an IBM processor. The third implementation configuration assumes that all the current DO and SAFE Software will reside at the IBM User Support Level and Global Level processors (reference 3.1.2). [redacted] 25X1

The SAFE software development associated with the DEMI count has the following components:

(a) System Services
(b) User Interface
(c) Message Processing
(d) Data Management
(e) Applications. [redacted] 25X1

The spread of the SAFE DEMIs associated with the software components to the DO User Support and Global Level subsystems for the three architectural implementations is shown in Figures 3-1, 3-2, and 3-3. The letters S, R and N refer to relative software transportability from SAFE and are defined as follows:

| SAFE SUBSYSTEM SOFTWARE COMPONENTS / VENDOR / DO SUBSYSTEM | BURROUGHS SCM | BURROUGHS EMP | BURROUGHS UTS | IBM RED/BLUE | BURROUGHS BPS | TOTAL DEMIS (K) S | R | N |
|---|---|---|---|---|---|---|---|---|
| SYSTEM SERVICES | | | | | | | | |
| – WBC SOFTWARE | S | S | S | – | – | 8.0 | | |
| – ICC SOFTWARE | S | S | S | R | S | 25.5 | 25.5 | |
| – FILE ACCESS SOFTWARE | S | S | S | R | S | 36.7 | 36.7 | |
| – DO/SAFE GATEWAY SOFTWARE | – | – | – | N | | | | 10.0 |
| – SYSTEM CONTROL AND MONITOR | S | S | S | R | S | 107.1 | 107.1 | |
| USER INTERFACE | | | | | | | | |
| – USER LANGUAGE PROCESSING | S | | S | | | 59.4 | | 10.0 |
| – DO USER LANGUAGE REQUIREMENTS | N | | N | | | | | |
| MESSAGE PROCESSING | | | | | | | | |
| – EXTERNAL SYSTEM INTERFACES | | S | | | | 53.0 | | |
| – DO UNIQUE EXTERNAL SYSTEMS INTERFACE | | N | | | | | | 10.0 |
| – MESSAGE ANALYSIS PROCESSING | | S | | | | 10.5 | | |
| – MESSAGE SEQUENCE CONTROL | | S | | | | 43.5 | | |
| – DOCUMENT DISSEMINATION PROCESSING | | S | | | | 50.5 | | |
| – DO UNIQUE MESSAGE PROCESSING | | N | | | | | | 10.0 |
| DATA MANAGEMENT | | | | | | | | |
| – SEARCH | S | | S | | S | 25.2 | | |
| – MAINTENANCE AND RETRIEVAL | S | S | S | | S | 48.1 | | |
| – INTELLIGENCE DATA FILE SOFTWARE | | | | | S | 99.55 | | |
| – DO UNIQUE DMS INTERFACES | | | | N | | | | 10.0 |
| APPLICATIONS | | | | | | | | |
| – SCREEN FORMAT CONTROL | S | | S | | | 24.5 | | |
| – USER REQUEST PROCESSING | S | | S | | | 16.0 | | |
| – TEXT PROCESSING CONTROL | S | | S | | | 14.9 | | |
| – TRANSACTION PROCESSING | S | | S | R | S | 22.0 | 22.0 | |
| – STATE CONTROL PROCESSING/STATUS | S | S | S | R | S | 10.5 | 10.5 | |
| – COMMON UTILITIES | S | S | S | R | S | 26.2 | 26.2 | |
| | | | | | TOTAL | 681.15 | 228.0 | 50.0 |

25X1

Figure 3-1. Implementation Software (U)

| SAFE SUBSYSTEM SOFTWARE COMPONENTS / VENDOR / DO SUBSYSTEM | BURROUGHS SCM | BURROUGHS EMP | BURROUGHS UTS | IBM RED/BLUE | IBM BPS | TOTAL DEMIS (K) S | TOTAL DEMIS (K) R | TOTAL DEMIS (K) N |
|---|---|---|---|---|---|---|---|---|
| SYSTEM SERVICES | | | | | | | | |
| – WBC SOFTWARE | S | S | S | – | – | 8.0 | | |
| – ICC SOFTWARE | S | S | S | R | R | 25.5 | 25.5 | |
| – FILE ACCESS SOFTWARE | S | S | S | R | R | 36.7 | 36.7 | |
| – DO/SAFE GATEWAY SOFTWARE | – | – | – | N | | | | 10.0 |
| – SYSTEM CONTROL AND MONITOR | S | S | S | R | R | 107.1 | 107.1 | |
| USER INTERFACE | | | | | | | | |
| – USER LANGUAGE PROCESSING | S | | S | | | 59.4 | | |
| – DO USER LANGUAGE REQUIREMENTS | N | | N | | | | | 10.0 |
| MESSAGE PROCESSING | | | | | | | | |
| – EXTERNAL SYSTEM INTERFACES | | S | | | | 53.0 | | |
| – DO UNIQUE EXTERNAL SYSTEMS INTERFACE | | N | | | | | | 10.0 |
| – MESSAGE ANALYSIS PROCESSING | | S | | | | 10.5 | | |
| – MESSAGE SEQUENCE CONTROL | | S | | | | 43.5 | | |
| – DOCUMENT DISSEMINATION PROCESSING | | S | | | | 50.5 | | |
| – DO UNIQUE MESSAGE PROCESSING | | N | | | | | | 10.0 |
| DATA MANAGEMENT | | | | | | | | |
| – SEARCH | S | | S | | R | 25.2 | 25.2 | |
| – MAINTENANCE AND RETRIEVAL | S | S | S | | R | 48.1 | 48.1 | |
| – INTELLIGENCE DATA FILE SOFTWARE | | | | | R | | 99.55 | |
| – DO UNIQUE DMS INTERFACES | | | | N | | | | 10.0 |
| APPLICATIONS | | | | | | | | |
| – SCREEN FORMAT CONTROL | S | | S | | | 24.5 | | |
| – USER REQUEST PROCESSING | S | | S | | | 16.0 | | |
| – TEXT PROCESSING CONTROL | S | | S | | | 14.9 | | |
| – TRANSACTION PROCESSING | S | | S | | R | 22.0 | 22.0 | |
| – STATE CONTROL PROCESSING/STATUS | S | S | S | | R | 10.5 | 10.5 | |
| – COMMON UTILITIES | S | S | S | R | R | 26.2 | 26.2 | |
| | | | | TOTAL | | 581.6 | 400.85 | 50.0 |

Figure 3-2. Implementation DMS Software (U)

| SAFE SUBSYSTEM SOFTWARE COMPONENTS / VENDOR / DO SUBSYSTEM | IBM | | | IBM | IBM | TOTAL DEMIS (K) | | |
|---|---|---|---|---|---|---|---|---|
| | SCM | EMP | UTS | RED/ BLUE | BPS | S | R | N |
| SYSTEM SERVICES | | | | | | | | |
| -- WBC SOFTWARE | R | R | R | – | – | | 8.0 | |
| – ICC SOFTWARE | R | R | R | R | R | | 25.5 | |
| -- FILE ACCESS SOFTWARE | R | R | R | R | R | | 36.7 | |
| – DO/SAFE GATEWAY SOFTWARE | – | – | – | N | | | | 10.0 |
| – SYSTEM CONTROL AND MONITOR | R | R | R | R | R | | 107.1 | |
| USER INTERFACE | | | | | | | | |
| – USER LANGUAGE PROCESSING | R | | R | | | | 59.4 | |
| – DO USER LANGUAGE REQUIREMENTS | N | | N | | | | | 10.0 |
| MESSAGE PROCESSING | | | | | | | | |
| – EXTERNAL SYSTEM INTERFACES | | R | | | | | 53.0 | |
| – DO UNIQUE EXTERNAL SYSTEMS INTERFACE | | N | | | | | | 10.0 |
| – MESSAGE ANALYSIS PROCESSING | | R | | | | | 10.5 | |
| – MESSAGE SEQUENCE CONTROL | | R | | | | | 43.5 | |
| – DOCUMENT DISSEMINATION PROCESSING | | R | | | | | 50.5 | |
| -- DO UNIQUE MESSAGE PROCESSING | | N | | | | | | 10.0 |
| DATA MANAGEMENT | | | | | | | | |
| -- SEARCH | R | | R | | R | | 25.2 | |
| – MAINTENANCE AND RETRIEVAL | R | | R | | R | | 48.1 | |
| -- INTELLIGENCE DATA FILE SOFTWARE | | | | | R | | 99.55 | |
| - DO UNIQUE DMS INTERFACES | | | | N | | | | 10.0 |
| APPLICATIONS | | | | | | | | |
| – SCREEN FORMAT CONTROL | R | | R | | | | 24.5 | |
| – USER REQUEST PROCESSING | R | | R | | | | 16.0 | |
| – TEXT PROCESSING CONTROL | R | | R | | | | 14.9 | |
| – TRANSACTION PROCESSING | R | | R | R | R | | 22.0 | |
| – STATE CONTROL PROCESSING/STATUS | R | R | R | R | R | | 10.5 | |
| – COMMON UTILITIES | R | R | R | R | R | | 25X1 | |
| | | | | | TOTAL | | 681.15 | 50.0 |

Figure 3-3. Implementation 3 Software (U)

S = Software directly usable from SAFE. Only high level system integration/testing is required.

R = The SAFE design is usable, but must be retrofitted to the DO System. This requires some redesign, recoding and full integration/testing.

N = New software requiring design, code and integration/testing. [redacted] 25X1

The cost assumptions are based on a $30/DEMI value (Note: original SAFE Budgetary Report had $40/DEMI, which reflected a higher overhead rate.) which was used for the SAFE costing. Assumed is a Design, Code and Test percent labor time spread of 40, 20 and 40, respectively. Applying this percent spread to transportability yields the following:

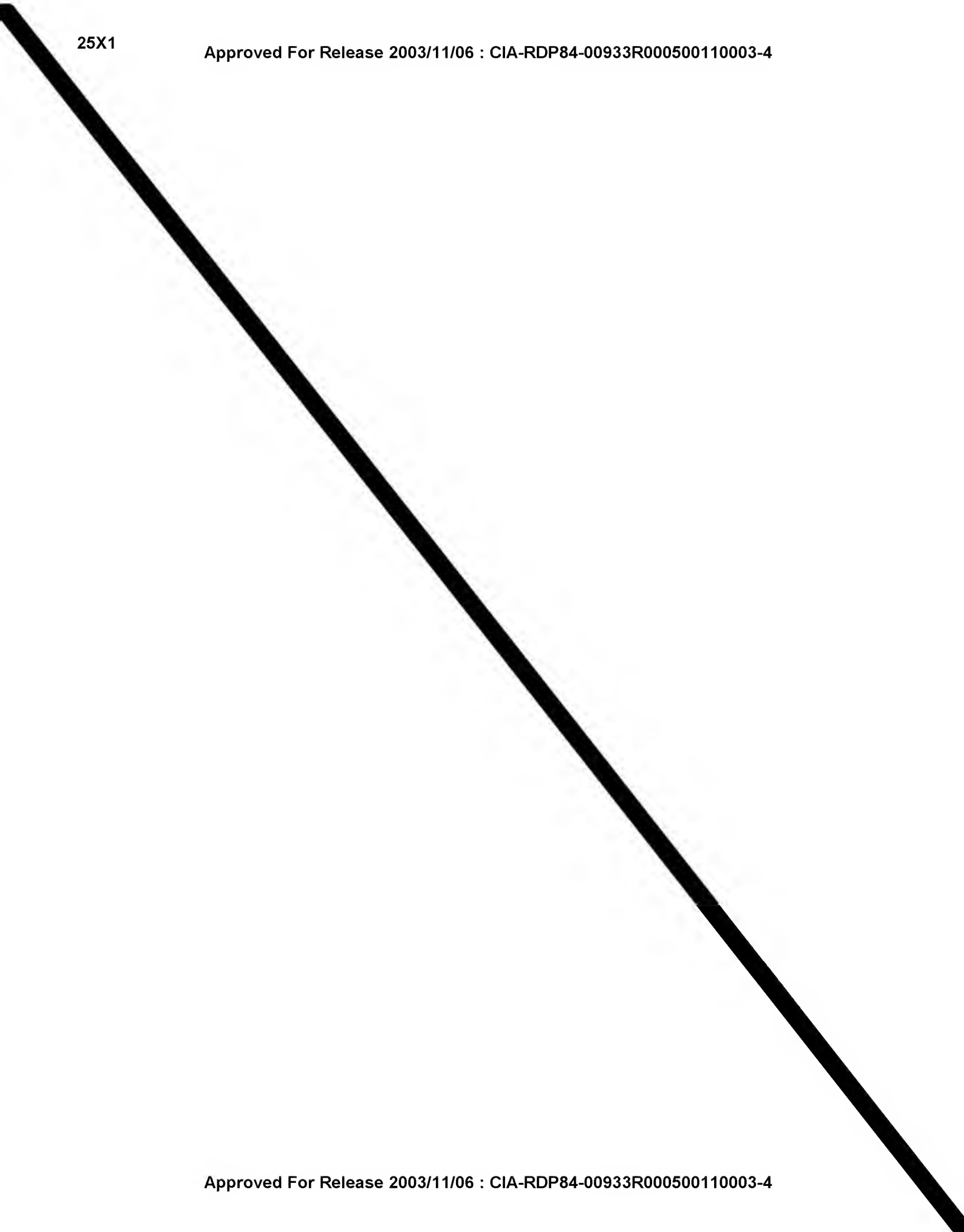
S = This software is essentially checked out, however there are costs associated with installation and system integration. Factor = .067 x $30/DEMI = $2/DEMI.

R = This software has some redesign, must be recoded and have full integration/testing.
Factor = .65 x $30/DEMI = $20/DEMI.

N = This software is all new.
Factor = $30/DEMI. [redacted] 25X1

The estimated DO System software costs for the three implementations using the above cost/DEMI and DEMI counts shown in Figures 3-1, 3-2 and 3-3 is shown in Figure 3-4 and are summarized below: [redacted] 25X1

Implementation 1 (Burroughs) --- [redacted] 25X1
Implementation 2 (Hybrid) ---
Implementation 3 (IBM) --- [redacted]



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25X1

3.3 Communications [redacted]

The tri-level architecture includes two major communications subsystems, namely, the Intercomputer Communications (ICC) System, and the Black Wideband Communications System (WBCS). In addition, the Electronic Message Processing (EMP) subsystem provides a gateway to system interfaces such as CDS. [redacted] 25X1

The ICC is based on the Network Systems Corporation HYPERchannel and includes the following elements:

| Component | Cost Estimate |
|---|---|
| Coaxial Cable | $ 2,000 |
| Network Adaptor | |
| A150 (Burroughs) | 36,750 each (Vendor quote) |
| A220 (IBM) | 36,750 each (Vendor quote) |

One network adaptor is required for each processor in the system to provide an interface to the two ICC cables. The adapters are included in the subsystem hardware costs, shown above in Tables I through VIII. [redacted] 25X1

The Processor Interface Unit (PIU) is needed for each subsystem processor interfacing with the WBCS, i.e., those processors at the User Support level of the system architecture. Based on the SAFE program, the non-recurring engineering cost is approximately $1 million, while the recurring cost is about $128,000 per unit. For a Burroughs User Support level (implementations 1 and 2), only the recurring cost is charged. Development of a PIU for an IBM User Support level is estimated to be about the same as for Burroughs, namely, $1 million. Recurring costs are estimated at $128,000 for lack of a definitive PIU design for an IBM interface. [redacted] 25X1

All cryptographic equipment is assumed to be GFE. [redacted] 25X1

A Bus Interface Unit (BIU) is needed for:

(a) Each User Workstation
(b) Each regional printer
(c) Each PIU, except those on the SCM processors.

The total quantity is estimated to be 500 for the Budgetary Analysis. At a unit cost of $2,000 per SAFE estimates, the total is $1 million. [redacted] 25X1

The WBCS coaxial cable is being installed currently and is assumed to be GFE. Consequently, no cost is included in this analysis for the cable. [redacted] 25X1

Engineering labor for the Communications effort is estimated at $300,000. [redacted] 25X1

In summary, the communications cost is estimated to about the same for any of the three implementations discussed. Costs are:

| Component | Cost |
|---|---|
| ICC Cable | [redacted] 25X1 |
| Network Adaptors | ncluded with ardware Subsystems) |
| WBCS Cable | |
| PIUs (8) | |
| Cryptographic Equip. | |
| BIUs | |
| Subtotal: | |
| Engineering Cost for IBM PIU | 1,000,000 |

TOTALS:

IMPLEMENTATION 1 - [redacted] 25X1
IMPLEMENTATION 2 -
IMPLEMENTATION 3 - [redacted] 25X1

25X1

3.4 System Engineering [redacted]

System Engineering cost rationale was referenced to the SAFE baseline and adjusted for the following factors:

(a) Many of the SAFE system engineering analyses (performance, connectivity (threads), interfaces definition, and cost) are applicable or upgradeable to the current effort.

(b) Performance models have been constructed which, to a large extent, can be used for DO ADPS simulation analyses following an applicability review and tuning of control parameters.

(c) Reliability/Availability/Maintainability (RAM) models have been defined for SAFE which can be refined and tuned for efficient analyses.

(d) Many system design decisions have been completed which have applicability, such as the WBCS, the software structures, the CDS interface, the ADSTAR (DORIC/W) interface, etc.

(e) Additional efforts are required to define the interfaces and integration approach of the ALLSTAR, COMET II, AIMS and other current and developmental Agency systems or programs. [redacted] 25X1

The System Engineering activities to be performed include System Requirements Engineering, System Design, Integration and Test, Logistics Planning, and Technical Specifications. [redacted] 25X1

The Budgetary Costs are [redacted] for implementation 1, [redacted] 25X1
25X1 for implementation 2, and [redacted] for implementation 3. The increasing 25X1
cost is representative of the system design transportability costs of going from Burroughs to IBM. This includes design breakage resulting from the changed processor hardware, the host language, and the increased effort in
25X1 interface definition. [redacted]

25X1

3.5 Project Management [ ]

Management of the project includes Program Planning, Contract Administration, Subcontract and Materiel Management, Performance Measurement System, Financial/Accounting, Status Reporting, Activity Network Control, Cost Reduction Reporting, Inventory Control and related functions. Based on the SAFE project, these management costs are estimated to be [ ] [ ] 25X1
25X1

25X1

3.6 Other [ ]

Other costs associated with the project include Configuration Management, Quality Control, Safety, Documentation Planning and Control, Data Management, Travel, Reprographics, Vendor Software Licenses, Maintenance and Support Equipment, Operations and Maintenance during development, Training and other similar categories. These costs are estimated at [ ] for the 25X1
25X1 development program. [ ]

## 4.0 SUMMARY [redacted] 25X1

In summary, the Budgetary Analysis has been conducted based on the best currently available information. The goal was to provide a reasonable best estimate of the development costs and to provide the visibility into assumptions and caveats to facilitate updates as more refined data become available. [redacted] 25X1

The implementations assumed are as follows:

(a) Implementation 1
  (1) GFE IBM Red and Blue Processors
  (2) Burroughs SAFE Global
  (3) Burroughs User Support Level (SCM, UTS, EMP)

(b) Implementation 2
  (1) GFE IBM Red and Blue Processors
  (2) IBM Transported SAFE Global
  (3) Burroughs User Support Level (SCM, UTS, EMP)

(c) Implementation 3
  (1) GFE IBM Red and Blue Processors
  (2) IBM Transported SAFE Global
  (3) IBM User Support Level (SCM, UTS, EMP). [redacted] 25X1 25X1

The corresponding cost data (in $1000s) are summarized in Table IX. [redacted]

For planning purposes, the Cost Summary has been allocated to Fiscal Years in accordance with the assumed baseline schedule. The remaining months of the current Calendar Year are dedicated to completion of Study Phase II and are not included in the funding profile. The funding requirements are subject to refinement as the detailed implementation planning process yields more detailed data. The Fiscal Year Cost Summary is shown in Table X. [redacted] 25X1

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